

# W5YI

America's Oldest Ham Radio Newsletter

## REPORT

Up to the minute news from the world of amateur radio, personal computing and emerging electronics. While no guarantee is made, information is from sources we believe to be reliable.

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## Amateurs to Share 13-cm Band with New Wireless Services!

A new Part 27 radio service to be known as the Wireless Communications Service ("WCS") has been proposed by the FCC in the 2305-2320 MHz and 2345-2360 MHz bands. The new service is a result of the 104th Congress' last minute Appropriations Act legislation which calls for the FCC to sell these bands at a public auction. The sale must begin no later than April 15, 1997. Furthermore, the funds raised must be deposited to the U.S. treasury no later than September 30, 1997. In a nutshell, the government wants the money fast!

The short work schedule required that the FCC put the proceeding on a super fast track. Toward that end, Congress specifically granted the Commission authority to use expedited administrative procedures. Only a three week comment period (to December 4) was allowed after General Docket 96-228 was released ...and the two week "Reply" period expires Dec. 16<sup>th</sup>.

The FCC said that they would be awarding new WCS licenses "...by competitive bidding using multiple round electronic auction procedures." Successful bidders will be allowed to provide any fixed, mobile, radiolocation or Satellite Digital Audio Radio Services ("SDARS") which is allowed by the international Radio Regulations. Digital Audio Radio is a sound broadcasting service in which compact disc quality programming is digitally transmitted by one or more space stations to large area locations. (See DAR report on page 2.)

### International & Domestic frequency allocations

The international frequency table specified that the 2300-2450 MHz band should be used for fixed mobile and radiolocation [direction finding by radio] services on a primary basis. In addition, the 2310-2360 MHz segment is allocated to satellite-delivered audio broadcasting and complementary land-based sound broadcasting. The entire 2300-2450 MHz band is internationally allocated to the Amateur Service on a secondary basis. (The United States does not allocate the 2310-2390 MHz segment to the Amateur Service.)

In the United States, the 2300-2310 MHz band was transferred from the Government frequency stockpile to the private sector on an exclusive basis as of August 10, 1995. The only non-Government use of this segment is by the Amateur Service. The 2310-2360 MHz band was re-allocated in 1995 on a primary basis to digital audio broadcasting, commonly known as satellite DARS.

### Reallocation of spectrum for WCS

The Congress directed the Commission to re-allocate the 2305-2320 and 2345-2360 MHz bands to unspecified wireless services. Toward that end, the FCC said that it would permit the broadest range of fixed, mobile and radio location services to operate in these segments on a primary basis. Satellite sound broadcasting will be limited to the 2310-



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2320 and 2345-2360 MHz bands. The FCC did say, however, that it was considering restricting Digital Audio Radio to just the 2345-2360 MHz segment due to the large number of Canadian fixed service facilities operating between 2310 and 2320 MHz.

The Commission said that they concluded when they established the General Wireless Communications Service ("GWCS") in August 1995, that the public interest would be best served by providing the flexibility for a mix of services most desired by the public.

The Commission especially wanted comment on how much spectrum should be provided for each WCS license. Five megahertz bandwidths would allow for paging, radiolocation, dispatch or point-to-point backbone operations. "Larger bandwidths, such as 10 to 15 MHz, would allow more direct competition with existing fixed and mobile service providers. Such an amount may also better support some multi-channel satellite DARS. Alternatively, a single 30 MHz license may offer the most effective approach for providing new two way fixed or point-to-multipoint uses such as interconnection with the Internet and other digital services." The FCC said it believed the principal use of WCS will involve the transmission or reception of communication signals to subscribers for compensation.

"We anticipate that the most likely uses of WCS will be to provide a mix of fixed and mobile services similar to other services currently operating on a subscription basis. Fixed (and radiolocation) services are expected to include services that are generally similar to the Multi-channel Multipoint Distribution Service ("MMDS"), the Location and Monitoring Service ("LMS"), Digital Termination Service ("DTS"), Digital Electronic Messaging Service ("DEMS") and certain of the services provided by Local Multipoint Distribution Service ("LMDS"). Mobile services are expected to include services generally similar to PCS, cellular, Specialized Mobile Radio ("SMR") and paging.

## Definitions:

**MMDS:** Also known as wireless cable television, MMDS can provide up to 28 channels of entertainment, education and information.

**LMS:** Formerly called "Automatic Vehicle Monitoring" - Primary user of the 902-928 MHz shared band. (Amateurs and Part 15 devices are secondary.) LMS technology makes possible the location and tracking of any number of mobile units as well the exchange of data between those units and an ordinary personal computer ("PC"). Applications include: advanced fleet dispatch, sensitive cargo tracking, wide area personal security and medical alert, hijacked vehicle tracking, stolen vehicle location, home arrest tracking, electronic fences, emergency vehicle tracking, real estate sales navigation, ...remote utility metering.

**DTS:** A wireless digital "Last Mile" that bypasses the phone company's twisted pair

**DEMS:** Wireless e-mail that bypasses local telcos.

**LMDS:** A wireless delivery service in which low-powered transmitters broadcast voice, data and video signals within a small (usually a metropolitan) area.

**PCS:** Wireless Personal Communications Services including small portable phones, portable facsimile, multi-channel cordless phones and advanced paging devices.

**SMR:** Communications systems between mobile radios and fixed earth-based antennas, normally limited to areas of heavy population.

"All of these services are currently provided to subscribers for compensation and we expect that the new WCS offerings would be provided on a similar basis. In this regard, even if a WCS licensee chooses to offer a satellite DARS service on that portion of the spectrum available for such use, we believe it likely that this service would also be offered on a subscription basis." The Commission said it wanted comments on this assessment. The FCC proposed a license term of 10 years for all WCS licensees.

## Impact on Amateur Service

The FCC proposed no changes to the 2300-2310 MHz secondary Amateur Service allocation and the secondary Aeronautical Telemetry operations permitted in the 2310-2360 MHz segments.

A question remains, however, about how potential WCS licensees will feel about Amateur operators having free secondary access to the 2305-2310 MHz segment with power levels ranging up to 1500 watts PEP ...especially when they will have to pay millions of dollars for their licenses. It will be the first time that the Amateur Service has shared radio spectrum with a licensee that has had to pay at auction for frequency access. Being a secondary user, Amateurs will not be permitted to interfere with primary WCS licensees.

Since Congress ordered the FCC to auction the 2305-2310 MHz segment for commercial purposes, the ARRL's Board of Directors voted in special session October 24 and 26, 1996, at Windsor Locks, Connecticut, to seek an increase in the Amateur Service allocation status, from secondary to primary, in the remaining 2300-2305 MHz segment.

## New Part 97 Rules

The Commission has proposed to amend Section 97.303(j)(2) to read as follows:

§ 97.303 Frequency sharing requirements.

\*\*\*\*\*

(j)\*\*\*



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- (2) The 2300-2310 MHz segment is allocated to the amateur service on a secondary basis. The 2390-2400 MHz and 2402-2417 MHz segments are allocated to the amateur service on a primary basis. No amateur station transmitting in the 2400-2450 MHz segment is protected from interference due to the operation of industrial, scientific, and medical devices on 2450 MHz.

\*\*\*\*\*

[The previous Rule - amended only last month - had the following first two lines.

- "(2) In the United States, the 2300-2310 MHz segment is allocated to the Amateur Service on a co-secondary basis with the Government fixed and mobile service. In this segment, the fixed and mobile services must not cause harmful interference to the Amateur Service."

That line is now proposed to now read:

- (2) The 2300-2310 MHz segment is allocated to the amateur service on a secondary basis.]

**Commissioner James H. Quello issued a separate statement** saying he was concerned about the effect of new wireless services on existing licensees. He said "For this reason, I emphasize that this NPRM. is intentionally very general." Quello emphasized that the FCC "...earnestly seeks guidance on the best use of this spectrum..."

## How broadcasting will be done in the future!

The Satellite Digital Audio Radio Service (SDARS) has been more than six years in the making. It began when Satellite CD Radio, Inc., filed a May 1990 license application to beam radio signals from a satellite. A great idea, but there was no such internationally authorized service!

"SDARS" is the radio version of Direct Broadcast Television ("DBS.") It is like hooking up a CD player to a transmitter; error-corrected digital signals are transmitted from a studio to a satellite and retransmitted to radio receivers on Earth. Today's 10 kHz bandwidth AM radio broadcasts are plagued by static and noise. FM radio (with about a 15 kHz frequency response) suffers from multipath interference. The big advantage of SDARS is crystal clear CD-quality broadcasts over a large coverage (coast-to-coast satellite footprint) area with no interference whatsoever. It could also supplement HF broadcasting with a more predictable, higher quality signal.

WARC-92 allocated the 1452-1492, 2310-2360 and 2535-2655 MHz bands to the Broadcasting-Satellite Ser-

vice-Sound ("BSS-Sound".) Most of the world will broadcast their satellite delivered audio service (called "World-Space") at 1452-1492 MHz. Strongly supported by industry, however, the United States (and India) adopted an S-Band home for its SDARS at 2310-2350 MHz.

An additional three companies (Primosphere LP, American Mobile Radio Corp., and Digital Satellite Broadcasting Corp.) filed DAR license applications in December 1992. Three of the four systems will operate as a commercial-free subscription (cable-TV like) service. Primosphere proposes a free, advertiser-supported service more in keeping with today's over-the-air broadcasters. It will cost each of them about \$500 million to get into the business.

The FCC did not allocate DAR spectrum until 1994. A *Notice of Proposed Rule Making* (1B Docket 95-81) was issued in 1995 which was strongly opposed by over-the-air broadcasters ...especially the National Association of Broadcasters.

While new receivers would be needed to receive DAR broadcasts, most of the commenters believed that the new service would bring huge benefits to the public and would have only a minimal impact on current radio broadcasting. Broadcasters fear that direct-to-car, portable radio and home broadcasts will cut into their market shares. Or worse. They note that digital CD recordings have now completely replaced analog vinyl 33-rpm records. But progress moves on. Cable-TV did not end over-the-air television ...which did not end movies as many feared.

Among other things, DAR has the potential to target niche audiences with specialized programming such as foreign language programming, music formats not usually carried by radio stations, and programming geared to children or senior citizens. The new radio receivers will be able to store digital programming in memory for later listening by pressing a button ...something that the music industry is worried about. At least one DAR broadcaster plans direct-to-computer data transmission via satellite.

Hoping to avoid paying for the spectrum, the four applicants agreed to divide the 50 MHz between 2310 and 2360 MHz into four equal 12.5 MHz segments. The FCC is only allowed to auction licenses when two or more applicants apply for the same spectrum and cannot share the spectrum. Congress, however, wants to offset the revenue loss from the repeal of the Gas Tax by auctioning off SDARS spectrum. The FCC reduced the available DAR spectrum to 25 MHz and is considering a further reduction to 15 MHz.

It will be at least two years before Digital Audio Radio can begin ...and four years before a 10% penetration. By that time, over-the-air analog broadcasters hope to convert to their own digital system.



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## VANITY CALL SIGN UPDATE

■ This is going to be old news for some of you, but the FCC finally (on November 5th) issued nearly 3,800 Gate Two "Vanity" station call signs to Extra Class Amateurs. The tickets (dated November 4th) and mailed the second week in November are now in the hands of the happy owners. Most call sign applicants thought they would be getting their call signs within a couple of days of the Sept. 23rd "Gate Two" kickoff. But it didn't happen. The six week delay was caused by two things.

First, in the interest of fairness (and in response to concerns from the Amateur community) the FCC decided to wait until all of the first day's Form 610-V applications had been processed by the Mellon Bank in Pittsburgh.

The Mellon Bank collects all regulatory fees for the FCC, deposits them to the U.S. treasury and - after date stamping - forwards the application to the FCC in Gettysburg for keying. They do this for all radio services ...not just the Amateur Service.

Many amateurs let the FCC know that they were concerned ("annoyed" is probably a better word) that the electronically-filed applications (which go direct ...right into to the FCC's computers) would be unfairly processed before those delivered in person ...or sent via overnight courier for "day one" arrival. So the FCC decided to wait until all of the first day's arrivals had been manually input into the computer.

To ensure accuracy, the FCC keyed each application in twice and then did a comparison check. Those that did not correspond, were rekeyed a third time. The FCC did not have extra help to handle this function and it took nearly a month to complete!

Secondly, around the middle of October there was a major computer disk crash at the FCC in Washington, DC. (That is where the Amateur Service database and programmers are located.) The disruption was not easily repaired and it was nearly three weeks before the computer went back online full time. Even some of the regular (sequentially issued) call signs issued the last week in October were in error and had to be corrected.

It wasn't until the first of November that the FCC computer was fixed. Finally, on November 4th, the FCC pushed "the button" and nearly 4,000 "Vanity" call

signs were split out.

Pandemonium raged as Vanity call sign recipients everywhere scrambled to learn their new call sign. The early information came from the ARRL's website. The FCC's (and our) phone lines and various Internet web-sites were incredibly busy. Most were happy! It seems that most applicants got their first or second call sign choice.

A few were not pleased. Especially the one's whose applications hit the "error list." (The FCC calls it WIPs ...or "Work in Progress.") But even these Amateurs should not be totally discouraged. We were told that just because an application hit the "error list" does not necessarily mean that you will not get one of your call sign choices. A Vanity call sign application (Form 610-V) still could have been assigned a chosen call sign - but is being held up due to some other irregularity. Applications with information (such as a birth date) that is different from the FCC database is temporarily sidetracked. There are about three hundred applications in the WIPs pigeon-hole which (at least until recently) were being worked on manually.

The FCC also reported that they were unable to grant any call signs to several hundred first day applications because all of their choices (sometimes only a single selection) was now unavailable. Some Amateurs also applied for call signs that they were not qualified for. (Such as one Japanese Extra Class Amateur with a continental U.S. address. He applied for call signs reserved for Hawaii. The fine print rules state that only Amateurs with mailing addresses outside the 48 contiguous states can apply for call signs reserved for the Pacific, Alaska and the Caribbean. Had he used a Hawaiian or South Pacific address he would have gotten one of his choices!)

These Amateurs will have to apply for a refund of their \$30.00 filing fee. The FCC said that no refunds will be issued unless one is requested.

There are still about six thousand choice (1-by-2 and 2-by-1 format) call signs still available. And more continually become available as the FCC completes their monthly purge of call signs coming out of the 2-year hiatus. A call sign cannot be reassigned until after 2-years after expiration, revocation, death of the holder ...or abandoning (vacating.)

Call sign applicants who do not get one of their choices are eligible for a refund - which must be specifically requested by a letter to the FCC/Gettysburg. They will not be able to file a new Form 610-V

without payment of an additional \$30 fee.

## The W5YI Group offers a list of available preferential call signs

...on an ASCII (IBM-compatible) computer disk for \$15.95 plus shipping. This disk is custom made to the requestor's specifications (call sign area and license class) from the FCC database which is updated daily. It takes into consideration every possible call sign factor - including call signs which can't be assigned for one reason or another! (Some prefixes and suffixes - and there are thousands of them - are excluded from ever being assigned!) We have shipped hundreds and hundreds of these disks! Included is an updated report (over 30-pages) that tells you everything you need to know about getting a call sign of your choice.

**Call (toll free) 1-800-669-9594**

We checked with the FCC just before press time and we were told that all further processing of Vanity call signs has now been halted. It seems that a group of Amateurs filed what amounts to a "Petition for Reconsideration" after their Form 610-V call sign applications were dismissed. Our understanding is that the FCC returned a batch of applications that arrived a couple of days early. A courier service seems to be at fault! They delivered the applications on Friday (Sept. 20) instead of Monday as instructed. The Mellon Bank returned them to the senders.

By the time the applicants got their applications back, Gate Two had already been open several days. The Amateurs involved are very disturbed that they missed having their application at the FCC on the first day (September 23rd) and claim it was not their fault. Regardless of the outcome, the fact remains that most of the call signs they requested have already been assigned.

The FCC has now placed the entire Vanity Call Sign System on indefinite "hold" until these Petitions can be resolved. We asked the FCC when they thought they would resume call sign processing and they were unable to give us any answer except "Whenever the Commission resolves the Petitions." When that will be is anyone's guess. "It could be a week ...it could be several months."

Once Vanity call sign processing begins again, the FCC will first complete applications that hit the error (WIPs) list. Then the FCC will begin processing the nearly 2,000 Form 610-V Vanity call



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sign applications received after September 23rd. Amateurs wishing to obtain call sign information should check any of the call sign servers located on the Internet's World Wide Web rather than call the FCC.

At this point, there is no estimated date as to when Gate 3 (for the Advanced Class) and Gate 4 (for the remaining license classes) will open. Best guess? After the first of the year.

Many of our readers have pointed out that many choice station call signs are going to individual Amateurs who have established multiple clubs after the FCC re-instated club licensing on March 25, 1995. For example: **James H. Roach, KD6VWK** of San Juan Capistrano, CA (trustee for the Ortega Wireless League) received ten choice Vanity call signs on November 4<sup>th</sup> ...among them: W6GS, K6HF, K6TT, W0AE, N2CW and his initials in three call areas (W2JR, W5JR and W6JR.) Roach holds 30 club calls.

## HAM RESTRUCTURING PETITION

■ According to a copy sent us, **Henry B. Ruh, KB9FO, of Crown Point, IN** (publisher of ATV Quarterly) filed an innovative *Petition for Rule Making* with the Commission on October 29th seeking to completely restructure the Amateur Service.

We tried to telephone him, but there was no telephone listed at his 3 N. Court Street address. In any event, the following is a heavily digested recap of his proposal which runs to 14 single spaced pages.

Ruh seeks to reduce the number of Amateur license classes to three which will be called Explorer, Adventurer and Expert. All existing licensee privileges will be "grandfathered" (continued) to allow a phase in of the new licenses and privileges.

He proposes allowing those holding a current Amateur Service license to either continue their present class and privileges ...or to adopt through meeting new criteria, a new license class and privilege set.

The VEC (self-examination) System would be continued - but its functions would essentially change from being examination oriented to overseeing practical applications of ham radio activities.

Ruh says "...that the Incentive Licensing structure initiated by the ARRL and implemented in the rules more than three decades ago, has not achieved its intended purpose, and is often blamed for the demise of manufacturers, and electronic

stores from the outflows of hams and the failure to attract new hams."

The Petition proposes to replace the current "rote memorization Q&A" system to one based on technical knowledge, operating experience and credit for continuing education. The exam portion would only cover areas "...where experience cannot easily be obtained such as electrical and RF safety." Ruh contends "...few new license holders ...are expanding their horizons into other areas of ham radio ...upgrading in order to become more proficient and knowledgeable."

As Henry Ruh sees it, ham radio licensing would be based on a "point system" ...with points obtained from experience and achievement which could be demonstrated in several ways. (Such as Worked All States, DXCC, and "certificates having a point value" issued by Amateur Radio publications and organizations for certain ham related activities. These activities could include "...having a technical article published, writing a computer program, building/publishing equipment, operating during specific events, participating in public service or demonstrations, attendance and completion of various ham classes established by a VEC..." Passage of an exam could be part but not the major portion of the overall point total. The proposed license classes are:

### EXPLORER:

- Must obtain 70 "points." 1 point for each correct answer to 100 question exam currently covered by Novice and Technician question pool. (5 points for subscribing to at least two ham magazines.)

There does not seem to be a requirement for demonstrated Morse code proficiency as required by international law when the operation takes place under 30 MHz.

- 2x3, 3x3 or 3x4 call signs or distinctive prefix: (WN, WNN, NAA, etc.)
- CW on 80, 40, 30, 15 and 10 m subbands. SSB on 25 kHz of 40 and 15 m. SSB on 50 kHz of 10m and VHF. FM on 2m, 1.25m, 33-cm and above 9cm. Digital on 1.25m and 33-cm and above. Spread Spectrum on 13-cm and above.
- May NOT be a repeater owner/operator/trustee. May NOT be a VE.
- Ten year license - renewable once for 5 years.

### ADVENTURER:

- Must obtain 150 points: [40 points for HF, 40 points for VHF/UHF/Microwave operation, 30 points for "Operating

proficiency" and 40 points for "General knowledge and experience"] ...verified by VE. An exhaustive menu of suggested ways that the needed points could be obtained is provided.

- After obtaining needed experience as an Explorer, licensee obtains full privileges on all bands/modes except those reserved for Expert Class.
- Obtains all frequencies permitted by the Advanced Class.
- May serve as a VEC.
- Qualifies for Group B, C and D station call sign.
- License term: 20 years, renewable once for additional 20 years.

### EXPERT:

- Passing criteria: 315 points. Must obtain 100 points for HF, 100 points for VHF/UHF/Microwave operation, 40 points for "Operating Proficiency", 30 points for "General knowledge and experience" and 45 points for "Extended areas." ...verified by local VE committee.

Again, a long list of ways these points could be obtained is provided. (For example: 20 points each - for DXCC, WAZ, WAS, 2000 contacts on at least 4 bands above 50 MHz. 10 points for CW speed in excess of 30 wpm, 10 points publication of technical article or build-it project. 5 points each for OSCAR, ATV, packet/digital, RTTY, FAX, VHF-DX operation, etc.)

- Privileges: All frequencies and modes.
- May build/operate/trustee repeaters.
- May serve as a Volunteer Examiner
- Call signs: Same as Extra Class.
- License term: life.

"The license class names were chosen for appeal and to be descriptive of the privileges allowed."

■ **AEA (Advanced Electronic Applications, Inc.)** of Lynnwood, WA is in the process of going out of business. We tried to telephone them but they are not taking any calls. We heard they are selling off product lines and that the company is for sale. So far, no takers.

■ **ICOM has a new general coverage all mode IC-R8500 receiver** that tunes from 100 kHz to 2000 MHz with 10 Hz resolution! List price: \$2,400.

■ **The Drake Amateur Radio Club of Franklin, OH** has obtained the call sign W8CYE originally held by Bob Drake, founder of the R. L. Drake Company. Obtained under the Vanity call sign program, the W8CYE call sign will be used on the club's 224.560 MHz repeater.



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## **Special Report: FCC GRANTS TAPR REQUEST TO CONDUCT SPREAD SPECTRUM EXPERIMENTS**

On November 8<sup>th</sup>, the FCC granted a Special Temporary Authorization (STA) to Greg Jones, WD5IVD, and Dewayne Hendricks, WA8DZP, on behalf of TAPR (Tucson Amateur Packet Radio, Corp., 8987-309 E Tanque Verde Rd #337, Tucson, AZ 85749-9399, Tel. 817-383-0000), to conduct VHF spread spectrum communications.

A Special Temporary Authorization (STA) is the authority granted to a licensee to permit radio transmissions for a limited period at a specified variance from the terms of the station authorization or requirements of the FCC rules applicable to the particular class of station.

TAPR was founded in 1982 as an international organization with interests in the areas of packet and digital communications. Today, TAPR continues as a membership supported non-profit amateur research and development organization, and currently has more than 2,000 members worldwide. Their current president is Greg Jones, WD5IVD of Austin, Texas

TAPR's members have participated in a number of experimental programs designed to investigate the value of spread spectrum emissions for the packet radio community, including experiments that later provided the basis for authorizing spread spectrum modulation in the amateur service.

Because of the rapid development of communications hardware and software, TAPR believes that the use of hybrid spread spectrum emissions, as well as spreading codes not envisioned by Section 97.311(d) of the Rules can be employed without causing harmful interference to other amateur operators.

### **What is Spread Spectrum?**

A spread spectrum system is one in which the transmitted signal is spread over a wide frequency band, much wider, in fact, than the minimum bandwidth required to transmit the information being sent. Spread spectrum communications cannot be said to be an efficient means of utilizing bandwidth. However, it does come into its own when combined with (overlaid on) existing systems occupying the frequency. The spread spectrum signal being "spread" over a large bandwidth can coexist with narrowband signals only adding a slight increase in the noise floor that the narrowband receivers see. As for the spread spectrum receiver, it does not see the narrowband signals since it is listening to a much wider bandwidth at a prescribed code sequence. There are several different Spread spectrum systems.

### **Advantages of Spread Spectrum:**

- Resists intentional and non-intentional interference
- Has the ability to eliminate or alleviate the effect of multipath interference

- Can share the same frequency band (overlay) with other users
- Privacy due to the pseudo random code sequence (code division multiplexing)

### **Background of the STA**

On April 10th, 1996, TAPR requested a waiver of the rules and regulations governing Amateur Radio spread spectrum communications in order to conduct an experimental program to test spread spectrum emissions over amateur radio facilities on different bands. The professionally completed STA Request was authored by TAPR's attorney, Henry Goldberg of the Washington, DC law firm of Goldberg, Godles, Wiener & Wright.

The TAPR request for a Special Temporary Authority (STA) was to conduct an experimental program to test Code Division Multiple Access (CDMA) spread spectrum emissions over amateur radio facilities. Except for the addition of one frequency band, TAPR's request is identical to that granted to Mr. Robert A. Buaas (K6KGS) on April 17, 1992.

#### **TAPR will:**

- Assess the strengths and weaknesses of the proposed systems;
- Evaluate the potential of spread spectrum overlay on conventional FM systems;
- Study the interference potential of CDMA spread spectrum emissions, if any, to existing users of the specified frequency bands;
- Evaluate the resistance of spread spectrum emissions to multipath interference;
- Evaluate the ability of spread spectrum emissions to improve spectrum efficiency;
- Evaluate the performance improvements potentially offered by CDMA technology;
- Gain operational experience with CDMA spread spectrum techniques; and
- Evaluate the proposals contained in the RM-8737 (Amendment of Part 97 of the Commission's Rules Governing the Amateur Radio Service to Facilitate Spread Spectrum Communications).

TAPR said the participants in this experimental will initially be various members of TAPR who are amateur radio licensees. The organization also requested authority to add participants, including licensed amateurs who are not members of TAPR, during the course of the experimental program upon notification to the Commission of such additions.

TAPR requested authority to operate CDMA spread spectrum emissions with a maximum 100-watt power level on the 6-meter, 2-meter, 1.25 meter, 70-cm, 33-cm, and 13-cm bands (50-54 MHz, 144-148 MHz, 219-220 MHz, 222-225 MHz, 420-450 MHz, 902-928 MHz, 1240-1300 MHz and 2390-2450 MHz.)

At present, Spread Spectrum is permitted on the



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following bands:

UHF: 70 cm (420-450 MHz), 33 cm (902-928 MHz), 23 cm (1240-1300 MHz), 13 cm (2300-2310 and 2390-2450 MHz) Recent rule making has allocated 2390-2400 MHz and 2402-2417 MHz to the Amateur community on a primary basis.

SHF: 9 cm (3.3-3.5 GHz), 5 cm (5.650-5.925 GHz), 3 cm (10.00-10.50 GHz), 1.2 cm (24.00-24.25 GHz)

EHF: 6 mm (47.0-47.2 GHz), 4 mm (75.5-81.0 GHz), 2.5 mm (119.98-120.02 GHz), 2 mm (142-149 GHz), 1mm (241-250 GHz), Above 300 GHz

## Requested Rule waivers

In order to conduct the tests discussed in this letter, TAPR requested the following Rule waivers:

- (1) Waiver of Section 97.305(c) of the Rules to permit emission type SS in the bands 6m, 2m, and 1.25m;
- (2) Waiver of Section 97.311(c) of the Rules to provide for transmission of hybrid spread spectrum emissions;
- (3) Waiver of Section 97.311(d) of the Rules is requested to permit the use of other spreading codes.

TAPR said it believes that the technical facts support their conviction that conventional and spread spectrum systems can coexist without detriment to conventional systems on all frequencies from MF to EHF.

## Response by the ARRL

Shortly after TAPR's request for the Spread Spectrum STA, the ARRL's General Counsel, Chris Imlay wrote the FCC generally opposing Spread Spectrum experimentation on the heavily used VHF-FM bands. Instead ARRL suggested that only the 219-220 MHz segment should be used.

This band is limited to amateur stations participating as forwarding stations in point-to-point fixed digital message forwarding systems. The ARRL said "The use of SS emissions would reduce the potential for interference, and might well permit amateurs to engineer-in a system in closer proximity to an AMTS licensee [the primary user of 219-220 MHz] than would otherwise be possible."

The League had "...serious concerns with regard to the proposed use of frequencies in the 6m, 2m, and 1.25m bands. The use of these additional frequencies would not appear to be required by the objectives stated in the STA request." The ARRL believes "...that spread spectrum emissions pose a significant interference potential to existing amateur operations in these bands.

"Unlike the situation with regard to 219-220 MHz, there is no geographic separation requirement that would protect narrowband users from interference from a nearby spread spectrum transmitter." The League said it supported the granting of the STA, but wanted the

request amended to show a list of participating stations; and additional VHF operations limited to 219-220 MHz.

## TAPR's Response to ARRL's letter

On May 24, 1996, TAPR's attorney (Henry Goldberg) hand delivered a letter to FCC's Bob McNamara, Chief, Private Wireless Division/Wireless Bureau. He acknowledged that the ARRL generally supported the requested STA.

On the question of ARRL's concern about the proposed use of frequencies in the 6m, 2m, and 1.25m bands, however, Goldberg said: "While TAPR and each of the licensee-applicants shares ARRL's commitment to preventing interference to existing amateur service operations in these bands, these parties urge the Commission to grant the STA as requested, permitting operation in each of the bands originally identified." He again mentioned that operation in each of these bands already is permitted pursuant to the spread spectrum STA originally granted to Mr. Robert A. Buaas in 1992." [This STA has been subsequently renewed by the Commission since granted four years ago.]

"Through the efforts of its member licensees, TAPR intends to continue its leading role in developing standards for spread spectrum communications for the amateur community. This can be done most efficiently and effectively, however, only if TAPR through its licensee members is itself in a position to coordinate participation in the testing and to oversee the program, rather than having to work through the Buaas STA," Goldberg said.

"ARRL's letter also understates the potential benefits of granting the requested authority to operate in the 6m, 2m, and 1.25m bands. ...More fundamentally, a great deal can be gained by permitting operation in these bands. Among other things, TAPR plans to study the strengths and weaknesses of proposed systems, a variety of potential interference issues, and the ability of spread spectrum emissions to improve spectrum efficiency. ...Due to the unique characteristics of operation in different bands, the type of broad-based study and analysis TAPR and its members contemplate can be achieved only if operation is permitted in a variety of different bands, characterized by different operating frequencies and sharing scenarios." Tapr urged that the Commission grant the STA request, including authority to operate in the 6m, 2m, and 1.25m bands.

## TAPR Board adopts position statement

The ARRL and TAPR Digital Communications Conference (DCC) is an international forum for radio amateurs in digital communications, networking, and related technologies to meet, publish their work, and present new ideas and techniques for discussion.

The TAPR Board adopted the following position statement at the most recent DCC on September 20,



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1996 in Seattle.

"The TAPR board feels strongly about TAPR's focus on spread spectrum technology and especially how it relates to the potential coexistence on frequencies that will have increased number of users occupying them. The amateur radio bands, like other spectrum will become more heavily utilized in the future. It is in the interest of amateur radio to develop systems that are interference-resistant while not interfering with other primary or secondary users on those frequencies.

"TAPR understands the concerns many have with the new technology, and believes that efforts in both education and research is necessary in order to allay the fears about interference and to demonstrate the benefits of the technology.

"TAPR believes that today's communications technology is moving toward all digital transmitters and receivers. These advances in technology, combined with the swift evolution of cell based transmission and switching protocols, are opening up a new set of possibilities for unique new services utilizing intelligent networks. These will contain smart transmitters, receivers, and switches.

"Today's Internet is perhaps the best example of a self-regulating structure that embodies these new technological approaches to communications in the networking domain. However, to date, many of these innovations have not moved into the wireless networking arena. TAPR will work on moving these innovations into the amateur radio community.

"TAPR feels that the VHF/UHF/SHF radio networks of the future will involve a mixture of links and switches of different ownership, which terminate at the end-user via relatively short-distance links. What will then be required is a built-in, distributed, self-governing set of protocols to cause the network's behavior to make more efficient use of a limited, common shared resource, the radio spectrum. Creating such a self-regulating structure for the optimal sharing of spectrum will require much effort. One of the major problems which stands in the way of these new approaches today is the current FCC regulatory environment and the manner in which spectrum is managed and allocated under its rules.

"Historically, the current regulatory approach to radio has been based upon the technology that was in use at the time that the Communications Act of 1934 was framed, basically what we would call today, 'dumb' transmitters speaking to 'dumb' receivers. The technology of that time required reserved bandwidths to be set aside for each licensed service so that spectrum would be available when needed.

"Given this regulatory approach, many new applications cannot be accommodated since there is no available unallocated spectrum to 'park' new services. However, given the new set of tools available to the entrepreneur with the advent of digital technology, what once were 'dumb' transmitters and receivers can now be smart devices which are capable of exercising greater judgment in the effective use and sharing of spectrum. The more flexible the tools that we incorporate in these devices, the greater the number of uses that can be accommodated in a fixed, shared spectrum."

## FCC Grants TAPR STA

On October 24, 1996, the ARRL's Board of Directors had a change of heart and directed its Executive

Vice President and General Counsel to inform the FCC that the League now supports the issuance of an STA to TAPR for their stated purpose and operational parameters identified in their request.

On November 6, 1996, TAPR's Greg Jones (WD5IVD) and Dewayne Hendricks (WA8DZP) provided the FCC with a letter which included:

- (1) A list of the initial amateur radio stations in the experimental program and agreed to file, on a quarterly basis, the names, call signs, and addresses of any additional stations that join the experimental program.
- (2) In order to conduct the experimental program, the Applicants are requesting that the Commission waive the following provisions of its Rules for the stations:
  - (a) Section 97.119(b)(5), to remove the requirement to transmit station identification signals by a CW or phone emission;
  - (b) Section 97.305(c), to permit spread spectrum emissions on amateur radio bands 50-54 MHz, 144-148 MHz, 219-220 MHz and 222-225 MHz;
  - (c) Section 97.311(c), to provide for transmission of hybrid spread spectrum emissions; and
  - (d) Section 97.311(d), to permit the use of other spreading codes.
- (3) The Applicants request STA for a period of six months from the date of grant, renewable for additional six-month periods.
- (4) The Applicants expressly acknowledge that any transmissions conducted pursuant to the requested STA will be secondary in nature, and must cease immediately in the event of harmful interference.
- (5) The Applicants will file with the Commission a report detailing the results of the experimental program discussed in the STA request, and will make that report available to members of the public.

On November 8<sup>th</sup>, 1996, the FCC granted the Special Temporary Authorization (STA) to Greg Jones, WD5IVD, and Dewayne Hendricks, WA8DZP, on behalf of TAPR (Tucson Amateur Packet Radio, Corp), regarding spread spectrum communications. Full details on the TAPR spread spectrum STA are available on its web page - <http://www.tapr.org> - under "Spread Spectrum."

TAPR will be announcing shortly how TAPR members can participate in their Spread Spectrum experiment beginning in the second quarter of the TAPR SS STA. It is also our understanding that the National Science Foundation (NSF) will be providing a grant to TAPR to assist in the development of inexpensive SS equipment kits.



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The following thought-provoking excerpts are from the Banquet Speech presented by two time TAPR president: Lyle Johnson, WA7GXD on September 21, 1996 at the ARRL & TAPR DCC in Seattle, WA.

## THOUGHTS ON THE RADIO SPECTRUM

One of the points I want to make is that we must keep in mind that Amateur Radio is a Service that we have under the FCC. We often talk about this wonderful hobby that we have, but hobbies are like tying fishing flies. This is a Service, it's licensed by the government, under government regulations.

And one of the things that strikes me about this is that the public has entrusted us with billions of dollars' worth of spectrum. Some of it's exclusive, some of it we share with other services. But, we're finding out more and more these days that the public is expecting its money's worth. And remember that the public that's granting us this privilege is the same public that brings lawsuits about our big antennas in our backyards.

So the Amateur Radio Service was formed in the Communications Act of 1934. There was a basis and purpose for it and there are four (if memory serves me correctly) basic pillars or precepts upon which our Service is formed. One of them would be public service, emergency communications, things of that nature. Another is to provide a trained reservoir of technicians and operators in times of national emergency. A third is to advance the radio art, and the fourth is for international goodwill.

And the thought struck me the other day when I was wondering about what should I talk about to this group of people. I was wondering, "This is 1996, not 1934. Would the FCC establish the Amateur Service today, in today's climate?" If we weren't trying to preserve what we had, but trying to carve out something new, would they take spectrum from someone else and give it to us? And if they would do it today, would they do it ten years from now or fifteen years from now? I got to thinking about that a little bit. And in 1934, public service communications radios were fairly rare and Amateur Radio could step in and do quite a lot. In 1996 we still provide public service but I think the public is a little bit less dependent upon us now than they were in 1934. What about the year 2010?

## ADVANCING THE RADIO ART

And what about advancing the radio art? Certainly in 1934 we contributed a lot. In 1996, I think we're still contributing, but it's somewhat less. But I wonder about what might happen in 2010.

To touch some of these points again... In terms of public service, I remember when my brother was stationed at government expense in a beautiful tropical paradise near the Cambodian border. And he was able to call home from time to time through something called MARS- the Military Affiliate Radio System, which was basically Ham Radio. And he called home and we got to talk to him for sixty seconds or one hundred and twenty seconds and then it was the next GI's turn. But in Desert Storm the phone company just put phone booths out in the desert and people just direct dialed home. MARS wasn't terribly relevant then.

Nowadays when a disaster hits- another hurricane hits

the East Coast, a twister hits the Midwest, the infrastructure gets damaged. When that happens, the hams step in and they provide emergency communications. How long do they provide that for? Months? Years? No, til the technicians fix the commercial infrastructure, then the commercial services take over again. Why? Because they're more efficient.

So, what's going to happen in a couple of years when Iridium will be here, the little LEO satellites get launched, and now you can grab your cell phone and you can directly link with the satellite, and the infrastructure doesn't get damaged when a hurricane occurs.

How meaningful are we going to be at that time? If you're driving down the road and you see an accident, you grab your two meter radio, you bring up the phone patch but four other people have already driven by with their 900 MHz handhelds and they've already reported the accident by direct dialing 911. So I think that if we look today and towards the future that one of those pillars that has held Amateur Radio up, that of Public Service, is going to be providing diminishing returns to the public in terms of these billions of dollars of spectrum that they're authorizing us to use. ...

If you were the public-- if you were the administrator-- would you be willing to give up a billion dollars of public spectrum for what you hear on the HF bands in terms of international goodwill? I'm not saying what we're doing is bad, I'm simply wondering, within the perspective of the billions of dollars that we're now faced with, what will we do?

So, to me, the pillar that's left, the strong one, is advancing the radio art. I think that's what we have to build our case upon. I don't think that we can build a strong case upon other things in the future, although we can to some degree today. Clearly, that's what the DCC is all about, that's what TAPR, AMSAT, AMRAD, the ARRL is heavily involved in this, that's what we do, that's what we're involved with ...trying to advance the radio art. But to do the radio art, you need radio, right? You need spectrum. OK? So we can't waste the spectrum.

## PERSONAL COMPUTERS ...AND PROGRESS

Twenty years ago there wasn't any viable PC industry in this country, but today the PC industry is roughly on par with the automotive industry in terms of its contribution to our economy. We're talking about an industry that did not exist twenty years ago!

And what is the PC industry, this tremendous wealth, what is this based on? Sand. Silicon- the most common element there is on our planet- silicon. But that's what a huge fraction of our economy is now based on, something that we walked out on and just shook it out of our shoes and walked down the beach and didn't worry about it much.

Well, what do we need? We need spectrum. How are we going to get that spectrum? Maybe we're going to get it by applying technology in ways that we haven't applied it before to create, in effect, more spectrum. ...

In the 1950s and 1960s when I went to school, nobody ever heard of the PC, we didn't care much about sand. We had slide rules, log tables, and ham radio. My kids went to school in the 1980s and 1990s and what did they use in school? ...they hook up to the World Wide Web. They take their tests electronically at home, they do their homework electronically and e-mail it in to their teacher. What's going to happen with my grandkids? I don't know either.

In the 1970s, or up to the 1970s the U.S. economy was



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based on manufacturing. Today, our economy is based on information and services.

## AMATEUR RADIO THEN AND NOW

Well, let's shift gears a little bit and gaze at the digital Amateur station of ten years ago. It's now 1986- most of us can still remember back that far. You had an 8088 or 80286. 1986- OK, maybe you had a Mac as well. You had a megabyte of DRAM, you had a forty megabyte hard drive, you had an EGA monitor (how many remember EGA monitors?). You had a Z80 TNC with a 1200 baud modem plugged into the audio jacks of your two meter radio, and you had a 1200, or if you were rich, a 2400 bit per second connection to The Source, or maybe CompuServe.

Let's look at that same digital Amateur station today. It's now 1996. You've got a high speed 486 or Pentium, it's got at least eight megabytes of RAM, you've got a one gigabyte hard drive and a SuperVGA monitor. You've got a 28.8 kilobit modem that cost \$99 connected up to your \$20 per month Internet connection. And you've got a Z80 TNC running at 1200 bits per second connected to your two meter radio. (Laughter)

What's wrong with this picture? Advancing the radio art is how we're going to retain what we have. Let's look at something else. Pretend it's 1944 now (I think most of us will have to pretend). If you ran into QRM on the frequency, well, what would you do? You'd QSY, change frequency, you'd QRZ, be sure the frequency was clear, and then you'd call CQ. ...

In 1954, you know, 10 years later, Single Sideband was starting to come on... You cut your spectrum in half so you could put twice as many people in the same amount of spectrum. In 1996, we're using what? Single Sideband. Same as we were using in 1954. It's nearly fifty years later [and] we're still using the SAME techniques.

## REPEATERS AND FREQUENCY COORDINATION

In the 1970s, FM repeaters suddenly took over the landscape in Ham Radio when it went from basically zero in 1970 to five thousand today (and I imagine that eight years ago it was four thousand, nine hundred and fifty). What happens today in 1996? You go to Ralph, your local frequency coordinator, and say "Ralph, I need a frequency for my repeater" and Ralph just kind of says, "What else is new?" Right? There aren't any.

So Ralph, your local frequency coordinator, he's empowered as a kind of a God now. He can hand out these frequencies-- these frequencies that are worth millions and millions of dollars. Ralph controls them now. And Joe Ham, who's a repeater owner, carefully warehouses that spectrum. He doesn't use it much but he wants to be sure nobody can use it either, so he has his frequency coordination thing. Meanwhile he goes to another channel that Ralph gave him so he can run his remote base on the mountaintop so he can call CQ DX.

But somebody else went up to a local mountaintop with a spectrum analyzer one day and they scanned two meters. And they noticed that "I can't get a repeater allocation. Yet, if I scan this band and make a graph over twenty-four hours, I'll find that this band is maybe being used five percent."

There's something wrong here. So we're very busy organizing things so we can warehouse spectrum with closed repeaters that other people can't use. There's something wrong here I think.

Now if you were a public policy maker, how would you feel about this? How would you react to the creation of this kind of a Service? Neither would I.

## LITTLE LEOS AND TWO METERS

Well, now we've got this what we call the Little LEO controversy-- the low earth orbiting guys. And they sat up there with their spectrum analyzer and noticed the same thing. So, now they've gone to the policy makers, and amongst the candidate bands (and we've all read the QST editorials) there's two meters and seventy centimeters on the table for consideration. Not to be taken, but to be shared. And we are treating this, and I suppose properly, as a call to battle-- we have to battle those little LEO guys. "We can't possibly let them share our spectrum- this is our sacred stuff." Joe's gotta have his warehouse because Ralph gave it to him--right?

I think that if we look at ourselves objectively, we have to say that we're grossly inefficient and that we're wasteful. We've been given a precious public resource and we're not utilizing it properly. Now the Little LEO guy can put his Spread Spectrum satellite on top of two meters and claim that he's not going to interfere with us, and he'll accept whatever we can dish at him because he knows how to handle it. Well, it's hard to argue that we're not going to share this underutilized resource with you because Ralph said it belonged to Joe... And I believe that this coexistence has been demonstrated to some extent with the STAs that were mentioned earlier in the Spread Spectrum talks today.

Well, it seems to me we have a choice here. We can either share our frequencies with the Little LEO guys, or we can share it with ourselves. If we don't share it with ourselves, we're going to have to share it with somebody else that might not be of our own choosing. So, it seems to me that we need to push really, really hard. And TAPR is doing this, and the League is doing this, we need to push really hard to get the Spread Spectrum rules relaxed.

How relaxed? My feeling of how Part 97 should read is easy-- "Here's your band limits. Have a nice day." I think we could fit the whole of Part 97 on this side of this three by five card in large type. So that even a bifocal guy like me could read it without glasses.

## NEED FOR TECHNOLOGICAL ADVANCEMENT

So, I think the stuff isn't magic, certainly. I think that, in my opinion, the only surviving basis that we're going to have over the next years for retaining our spectrum is technological advancement. I think we need to keep pressing on. I think we need to be very aggressive. I think with the rate of change and pace of change we need to be less conservative and more assertive. I think we need to expand our participation, speaking from a TAPR viewpoint, in the FCC and ARRL processes, and I know that TAPR is doing that. I think we have to press HARD for Spread Spectrum.

We need to develop radios, we need to put them in people's hands just like we did with the Beta Test in 1982 with TNCs. I'd love to see a Beta Test in 1997 of Spread Spectrum radios to get out there into the Amateur community. I'd like to see us pushing the bit rates faster and faster.

Above all, I want to see us have a lot of fun. Because this is an Amateur Service- we're not allowed to make money at it so we might as well have a good time.